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REMARKS

Reconsideration and continued examination of the above-identified application are respectfully requested.

The claims have been amended as described in more detail below. No search is necessitated by this amendment and no new questions of patentability should arise, since the scope of this subject matter has already been examined by the Examiner. No new matter has been added. Finally this amendment places the application in condition for allowance. Therefore, entry of this amendment is respectfully requested.

Pending Claims

Claims 57 and 65 have been amended to more clearly describe what Applicants regard as the invention. Claims 57-67, 70-72, and 80-86 are pending.

Summary of the Invention

The present invention relates to modified pigment products comprising a pigment having attached at least one aromatic or alkyl group X which is substituted with at least one group comprising the formula $-\text{[polymer]R}$. Ink compositions and, in particular, inkjet ink compositions comprising these modified pigment products are also disclosed.

Rejection of Claims Under 35 U.S.C. § 102

Whitehouse et al.

The Examiner has rejected claims 57-59, 65-67, and 86 under § 102(e) as being anticipated by Whitehouse et al. (U.S. Patent No. 6,337,358). Applicants respectfully disagree.

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In paragraph 3 of the Office Action, the Examiner references paragraph 5 of the previous Office Action mailed 8/1/02. In paragraph 10 of the Office Action, the Examiner summarizes Applicants' previous arguments concerning Whitehouse et al., stating that Applicants argue that Whitehouse et al. discloses polymers obtained by free radical polymerization while the polymers of the present claims are either condensation-type polymers or are polymers formed by hydrolysis reactions. However, the Examiner further states that there is no requirement in the present claims regarding how the polymer is obtained and that the present claims encompass polymers whether they are formed by free radical polymerization, polycondensation, or hydrolyses reactions. The Examiner also states that the present claims include polyelectrolyte while Whitehouse et al. discloses that the polymer is obtained from monomers such as meth(acrylic) acid, which would form polyelectrolyte.

Claims 57 and 65, as herein amended, relate to a modified pigment product and an ink composition comprising at least one liquid vehicle and at least one modified pigment product. The modified pigment product comprises a pigment having attached at least one aromatic or alkyl group X, wherein X is substituted with at least one group comprising the formula: -[polymer]R. "Polymer" represents a polycarbonate group, a polyether group, a polyimide group, a polyurethane group, a polyamide group, a polyester group, poly(vinyl alcohol), or combinations thereof.

The polymers disclosed in Whitehouse et al. are not the types of polymers recited in amended claims 57 or 65 of the present invention. Specifically, the polymers in Whitehouse et al. are formed by free-radical polymerization. In contrast, the polymeric groups represented by the group "polymer" of amended claim 57 are either condensation-type polymers or are polymers formed by hydrolysis reactions of vinyl polymers.

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While the present claims do not specify how the group "polymer" is formed, Applicants believe that one of ordinary skill in the art of polymers and polymerizations would readily recognize the class of polymer listed in the claims and would know how they are obtained. For example, one skilled in art of polymers would readily recognize that polyamides are polymeric materials that include $-C(O)NH-$ groups in the backbone. These types of groups are not formed by radical reactions but rather by condensation reactions of an amine and an acid or other nucleophilic/electrophilic reactions. One skilled in the art would not include a polyamide in a polymer class that is prepared by free radical polymerization – a polyamide is not a free-radical polymer. Similarly, polyethers, polyimides, polyurethanes, and polyesters are not polymer classes considered to be free-radical polymers, as disclosed by Whitehouse et al. Polyvinyl alcohol is also not in a free radical-type polymer. One skilled in the art would readily recognize that PVOH is prepared by the hydrolysis of polyvinyl acetate. This is also not a polymer disclosed in Whitehouse et al.

Thus, Whitehouse et al. discloses a different class of attached polymers (namely, those formed from free radical-polymerizable monomers) and not those of amended claims 57 or 65. Claims 58-59 and 66-67 are dependent from claims 57 and 65 respectively and are further distinguishable over the cited reference. Applicants therefore believe that Whitehouse et al. does not anticipate claims 57-59 or 65-67.

Claim 86 relates to an ink composition comprising at least one liquid vehicle and at least one modified pigment product comprising a pigment having attached at least one aromatic or alkyl group X, wherein X is substituted with at least one group comprising the formula: $-[\text{polymer}]R$. "Polymer" represents repeating monomer groups or multiple monomer groups or both having at least one $-X'$ group. X and X' are the same and are attached to the pigment.

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Whitehouse et al. does not disclose the modified pigment product used in the ink composition of claim 86. Specifically, there is no disclosure of a pigment having an attached X group, substituted with a polymer group having at least one X' group, wherein X and X' are the same. In addition, the Examiner has not indicated any sections of Whitehouse et al. that disclose this type of modified pigment. Applicants' therefore believe that Whitehouse et al. does not anticipate claim 86.

Therefore, Applicants believe that claims 57-59, 65-67, and 86 are not anticipated by Whitehouse et al. and respectfully request that this rejection be withdrawn.

Hall et al.

The Examiner has rejected claim 57 under § 102(e) as being anticipated by Hall et al. (U.S. Patent No. 5,552,458). Applicants respectfully disagree.

In paragraph 4 of the Office Action, the Examiner references paragraph 7 of the previous Office Action mailed 8/1/02. In paragraph 10 of the Office Action, the Examiner summarizes Applicants' previous arguments concerning Hall et al., stating that Applicants argue that Hall et al. does not disclose attached aromatic or alkyl groups on a pigment but rather discloses pigments having attached silane groups. The Examiner further states that, since Hall et al. discloses pigments having attached groups of the formula $R^2-Si-AX$ where R^2 is a C_1-C_{10} alkyl group and X is attached to the polymeric backbone, there is therefore an alkyl group attached to the pigment as required in the present claims. The Examiner acknowledges that the polymer is attached to the pigment through the silane group, but notes that there is no requirement in the present claims that the polymer must be directly attached to the alkyl group or that the alkyl group have no other groups attached to it.

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Claim 57, as herein amended, relates to a modified pigment product comprising a pigment having attached at least one aromatic or alkyl group X, wherein X is substituted with at least one group comprising the formula: $-\text{[polymer]R}$ and wherein X and X' are directly attached to the pigment. Therefore, Applicants believe that claim 57 is not anticipated by Hall et al. and respectfully request that this rejection be withdrawn.

Lin et al.

The Examiner has rejected claim 86 under § 102(b) as being anticipated by Lin (U.S. Patent No. 5,281,261). Applicants respectfully disagree.

In paragraph 5 of the Office Action, the Examiner states that Lin discloses modified pigment wherein a polymer is attached to the pigment through an aromatic group and that the polymer includes an alkyl or aromatic group. The Examiner also states that there is disclosed an ink jet ink which comprises a liquid vehicle and the above modified pigment. The Examiner concludes that, in light of this, Lin anticipates the present claim. Applicant respectfully disagrees.

Claim 86 relates to an ink composition comprising at least one liquid vehicle and at least one modified pigment product comprising a pigment having attached at least one aromatic or alkyl group X, wherein X is substituted with at least one group comprising the formula: $-\text{[polymer]R}$. "Polymer" represents repeating monomer groups or multiple monomer groups or both having at least one $-X'$ group. X and X' are the same and are attached to the pigment.

Lin et al. does not disclose the modified pigment product used in the ink composition of claim 86. Specifically, there is no disclosure of a pigment having an attached X group, substituted with a polymer group having at least one X' group, wherein X and X' are the same. In addition, the Examiner has not indicated any sections of Lin et al. that disclose this type of modified pigment.

Therefore, Applicants believe that claim 86 is not anticipated by Lin et al. and respectfully request that this rejection be withdrawn.

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Rejection of Claims Under 35 U.S.C. § 103

Whitehouse et al. in view of Belmont et al.

The Examiner has rejected claims 60-61 under § 103(a) as being unpatentable over Whitehouse et al. (U.S. Patent No. 6,337,358) in view of Belmont et al. (U.S. Patent No. 5,571,311). Applicants respectfully disagree.

In paragraph 7 of the Office Action, the Examiner references paragraph 9 of the previous Office Action mailed 8/1/02. In paragraph 10 of the Office Action, the Examiner agrees that there is no disclosure in Belmont et al. of pigments having attached at least one aromatic or alkyl group wherein X is substituted with polymer. However, the Examiner notes that Belmont et al. is used as a teaching reference for the concept of attaching functional groups to alkyl or aromatic groups that are attached to pigments in order to increase the dispersability of the pigment. The Examiner concludes that this, in combination with the primary reference, discloses the presently claimed invention.

Claims 60-61 relate to a modified pigment product comprising a pigment having attached at least one aromatic or alkyl group X, wherein X is substituted with at least one group comprising the formula: $-\text{[polymer]R}$. "Polymer" represents a polycarbonate group, a polyether group, a polyimide group, a polyurethane group, a polyamide group, a polyester group, poly(vinyl alcohol), or combinations thereof. X is further substituted with at least one functional group.

As discussed in more detail above, the modified pigment product of present claim 57, from which claims 60-61 depend, is not the modified pigment disclosed in Whitehouse et al. Specifically, Whitehouse et al. teaches modified pigments having attached polymers prepared from free-radical polymerizable monomers of the type that would react with a stable free radical (SFR) group. Therefore, Whitehouse et al. does not teach or suggest the polymers of the type disclosed in claims 60-61.

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Belmont et al. does not cure the deficiencies of Whitehouse et al. Applicants agree that Belmont et al. discloses pigments having attached alkyl or aromatic groups which are substituted with functional groups such as a carboxylic group or a sulfonate group. However, there is no teaching or suggestion in Belmont of a modified pigment product comprising a pigment having attached at least one aromatic or alkyl group X, wherein X is substituted with at least one group comprising the formula: $-\text{[polymer]R}$. Therefore, while Applicants agree that Belmont et al. does teach the concept of functional groups to alkyl or aromatic groups that are attached to a pigment in order to achieve certain properties, the pigments to which these groups are attached are not those disclosed in the present claims. Furthermore, Applicants believe that it would not be obvious to one of ordinary skill in the art based on the disclosure of Belmont et al. to attach a group X having both a functional group and a polymer group. Belmont et al. does not teach or suggest this concept. Thus, Belmont et al. does not disclose the modified pigments of present claims 60-61.

Furthermore, even if one were to combine Whitehouse et al. with Belmont et al., one of ordinary skill in the art would not arrive at the invention of present claims 60-61. Instead, if one of ordinary skill in the art were to combine the teaching of Whitehouse et al. and Belmont et al., one would be lead to prepare a modified pigment having an attached aromatic group substituted with a functional group such as carboxylic or sulfonate groups and further comprising polymers prepared from free-radical polymerizable monomers. These are not the modified pigments of present claims 60-61.

Therefore, Applicants believe that claims 60-61 are patentable over Whitehouse et al. in view of Belmont et al., and respectfully request that this rejection be withdrawn.

Whitehouse et al. in view of Johnson et al.

The Examiner has rejected claims 62-64 and 70-72 as being unpatentable over Whitehouse et al. (U.S. Patent No. 6,337,358) in view of Johnson et al. (U.S. Patent No. 5,837,045).

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In paragraph 8 of the Office Action, the Examiner references paragraph 10 of the previous Office Action mailed 8/1/02. In paragraph 10 of the Office Action, the Examiner agrees that there is no disclosure in Johnson et al. of pigments having attached at least one aromatic or alkyl group wherein X is substituted with a polymer. However, the Examiner notes that Johnson et al. is used as a teaching reference for the concept of attaching chemical groups to pigments in order to produce pigment which is more dispersable and has greater stability. The Examiner concludes that this, in combination with the primary reference, discloses the presently claimed invention.

Claims 62-64 and claims 70-72 relate to a modified pigment product and an ink composition comprising at least one liquid vehicle and at least one modified pigment product. The modified pigment product comprises a pigment having attached at least one aromatic or alkyl group X, wherein X is substituted with at least one group comprising the formula: $-\text{[polymer]R}$. "Polymer" represents a polycarbonate group, a polyether group, a polyimide group, a polyurethane group, a polyamide group, a polyester group, poly(vinyl alcohol), or combinations thereof. The modified pigment product further comprises a second chemical group attached to the pigment.

As discussed in more detail above, the modified pigment product of present claims 57 and 65, from which claims 62-64 and 70-72 depend, are not the modified pigments disclosed in Whitehouse et al. Specifically, Whitehouse et al. teaches modified pigments having attached polymers prepared from free-radical polymerizable monomers of the type that would react with a stable free radical (SFR) group. Therefore, Whitehouse et al. does not teach or suggest the polymers of the type disclosed in claims 62-64 and 70-72.

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Johnson et al. does not cure the deficiencies of Whitehouse et al. Applicants agree that Johnson et al. discloses a modified pigment having attached carboxyphenyl or sulfophenyl groups. However, there is no teaching or suggestion in Johnson et al. of a modified pigment product comprising a pigment having attached at least one aromatic or alkyl group X, wherein X is substituted with at least one group comprising the formula: $-\text{[polymer]R}$. Therefore, while Johnson et al. does teach the concept of attaching chemical groups to pigments in order to achieve certain properties, the pigments to which these groups are attached are not those disclosed in the present claims. Furthermore, Applicants believe that it would not be obvious to one of ordinary skill in the art based on the disclosure of Johnson et al. to attach secondary groups to a pigment which also has an attached group comprising a polymer. Johnson et al. does not teach or suggest this concept.

Furthermore, even if one were to combine Whitehouse et al. with Johnson et al., one of ordinary skill in the art would not arrive at the invention of present claims 62-64 and 70-72. Instead, if one of ordinary skill in the art were to combine the teachings of Whitehouse et al. and Johnson et al., one would be lead to prepare a modified pigment having an attached aromatic group substituted with a functional group such as carboxyphenyl or sulfophenyl groups and further comprising polymers prepared from free-radical polymerizable monomers. These are not the modified pigments of present claims 62-64 or 70-72.

Therefore, Applicants believe that claims 62-64 and 70-72 are patentable over Whitehouse et al. in view of Johnson et al. and respectfully request that this rejection be withdrawn.

Whitehouse et al. in view of Belmont et al.

The Examiner has rejected claims 80-85 as being unpatentable over Whitehouse et al. (U.S. Patent No. 6,337,308) in view of Belmont et al. (U.S. Patent No. 5,571,311).

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It is unclear which reference the Examiner has cited. U.S. Patent No. 6,337,308 is to Adams et al. and relates to methods and apparatus for homogenizing drilling fluids in an open loop process. If the Examiner had meant U.S. Patent No 6,337,308, Applicants believe these references are not combinable since they relate to very different fields.

Applicants have assumed that the Examiner had intended to refer to U.S. Patent No. 6,337,358 to Whitehouse et al. If the Examiner had intended to refer to a different Whitehouse et al. patent, clarification by way of a new Office Action is requested so that Applicants have the opportunity to review the art and prepare a suitable response.

In paragraph 9 of the Office Action, the Examiner states that Whitehouse et al. discloses a modified pigment comprising a pigment having attached a group of the formula $A-R^1-C-X-SFR$, where A is an aromatic group, X is a polymer, and SFR is $O-Ar^2$ where Ar is an aromatic group, and it is further disclosed that the above group can be terminated with hydrogen instead of SFR. The Examiner also states that the polymer includes that obtained from monomers such as styrene and alkyl (meth)acrylate, i.e. polymer comprises presently claimed X' group of alkyl or aromatic group, as well as polyamide, polyvinyl alcohol, and polyester, and that inkjet inks are also disclosed. However, the Examiner further states that, while Whitehouse et al. discloses that the ink contains other conventional additives such as binders, this reference does not disclose any specific types of polymers utilized. The Examiner then states that Belmont et al, which is drawn to inkjet inks, discloses the use of binders such as polyester, styrene-acrylic acid, polyester-melamine, styrene-acrylic acid-alkyl acrylate, styrene-methacrylic acid, etc. in order to hold the colorant onto paper. The Examiner then concludes that, in light of the motivation for using specific additional polymer disclosed by Belmont et al, it would therefore have been obvious to one of ordinary skill in the art to use such polymer as the binder in the inkjet ink of Whitehouse et al. and thereby arrive at the claimed invention. Applicants respectfully disagree.

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Claims 80-85 of the present application relate to an ink composition comprising a) at least one liquid vehicle; b) at least one modified pigment product comprising a pigment having attached at least one aromatic or alkyl group X, wherein X is substituted with at least one group comprising the formula $-\text{[polymer]R}$, and c) at least one additional polymer. As acknowledged by the Examiner, Whitehouse et al. does not disclose any specific types of polymers but only states that binders may be added. The Examiner then relies on Belmont et al. as teaching specific types of polymers that can be added to an ink composition comprising a modified pigment. However, Belmont et al. does not disclose a modified pigment having an attached polymer. Therefore, Applicants believe that one skilled in the art would not look to Belmont et al. to cure the deficiencies of Whitehouse et al. since the specific type of modified pigment is not disclosed in Belmont et al.

Furthermore, even if one were to combine the teachings of each of these references, it would not have been obvious that such a combination would work. Specifically, Applicants believe that it would not be obvious to one skilled in the art that at least one additional polymer could be added to an inkjet ink composition comprising a modified pigment that also has an attached polymeric group and that this combination would result in a composition that would still function as an inkjet ink. Inkjet inks must meet very stringent requirements, and it is very common that even small changes in formulation result in the preparation of an ink that cannot be jetted. Therefore, Applicants believe that it would not be obvious to use the polymers described in Belmont et al. in combination with the teaching of Whitehouse et al. in order to produce the inkjet ink compositions of claims 80-85.

Therefore Applicants believe that claims 80-85 are patentable over Whitehouse et al. in view of Belmont et al. and respectfully request that this rejection be withdrawn.

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Conclusions

In view of the foregoing remarks, Applicant believes that this application is considered to be in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would further expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,

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